

Fossil record and disappearance of peafowl (*Pavo* Linnaeus) from the Balkan Peninsula and Europe (Aves: Phasianidae)

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Introduction

The Balkan Tertiary avifauna is still poorly studied. A total of 21 Tertiary sites, containing fossils of birds are known from all 10 Balkan countries (including the Balkan parts of Romania and Turkey), 10 of them from Bulgaria (MLIKOVSKY, 1996a). Because of their unique geographical position, the Balkans served as a bridge for the terrestrial faunal migrations during the whole Tertiary period and later as well, a fact that was well documented by the fossil mammalian fauna (SPASSOV, 2000). This determines their significance as a region of considerable palaeozoogeographical interest for the whole European continent. Some of the latest (end of 1999) palaeontological discoveries contribute to the evaluation of the importance of the Balkan Peninsula as one of the regions of Europe of the last "tropical" elements among the terrestrial fossil bird fauna as well.

The fossil record of peafowl from the Balkan Peninsula

Recently five bones, four of them originating from Bulgaria and one from Greece, have contributed to the so far scanty fossil record of the genus *Pavo* on the Balkans. The Bulgarian finds represent four pedal phalanxes of an adult individual, kept in the National Museum of Natural History (Sofia): phalanx 2 dig. II pedis; phalanx 2 dig. III pedis; phalanx 3 dig. IV pedis; phalanx distalis dig. I pedis. The phalanx 2 dig. III pedis is broken and the proximal articular part of the bone is not preserved (BOEV, 2001). All other finds are of excellent preservation and even the tiny vascular pores on the bone surfaces are clearly seen. The find from Greece represents a distal half of the left tibiotarsus of an adult individual. The surface of the bone is damaged, but the distal end is preserved in good condition. The find is kept in the Laboratory of Geology and Palaeontology of the University of Thessaloniki (BOEV & KOUFOS, 2000). All these finds are referred to the fossil Bravard's Peafowl *Pavo bravardi* (Gervais, 1849), known until now from Western Europe only (BOEV, 2001). A detailed

morphological description of the Bulgarian and Greek fossil remains of *P. bravardi* is given in BOEV (2001) and BOEV & KOUFOS (2000).

Short data on the Balkan localities of peafowl

Muselievo locality (Bulgaria). The site is a rock shelter of up to 1,5 m depth in a destroyed Pliocene cave in ? Sarmatian limestones, about 1 km SE of the Muselievo Village (Lovech District, N Bulgaria) and 350 m off the right bank of the Ossam River; 150 m a. s. l. (43.36 N, 24.50 E). Associated fauna: Reptilia: *Chelonia* fam. indet.; Aves: *Accipiter* sp., *Falco* sp. ex gr. *cherrug*, *Lagopus* aff. *atavus*, *Pavo bravardi*, Passeres fam. indet. and Aves indet. (Boev, 2001); Mammalia: *Mimomys occitanus*, *Pseudomeriones abbreviatus*, *Rhagapodemus hautimagnensis*, *Myomimus dehmi*, *Sus minor*, *Sciurus* sp., *Glis* sp., *Apodemus* sp., *Rhinolophus* sp., *Miniopterus* sp., *Dolichopithecus* sp. (POPOV & DELCHEV, 1997), *Talpa* cf. *csarnotana*, *Blarinoides mariae*, *Deinsdorffia kordosi*, *Mafia csarnotensis*, *Episoriculus gibberodon*, *Hypolagus brachignatus*, *Trischizolagus* cf. *dimitrescuae*, *Pliopentalagus* cf. *dietrichi*, *Pratilepus kutschurganicus*, *Ochotonoides csarnotanus*, *Dolomys odessanus*, *Pliomys hungaricus*, *Dryomimus* cf. *eliomyoides*, *Glis minor*, *Apodemus* cf. *dominnans*, *Allocricetus* cf. *bursae*, *A. ehki*, *Trilophomys pyrenaicus*, *Prospalax priscus*, *Pliospalax compositodontus*, *Myotis* sp., *Pliopetaurista* sp. and *Sciurotamias* sp. (POPOV, in press), *Vulpes* sp., aff. *Nyctereutes* sp., Felidae gen.(? *Dinofelis* sp.), *Sus arvernensis minor*, *Cervus* cf. *pardinensis*, *Procapreolus* sp., aff. *Gazella* sp., *Tapirus arvernensis*, cf. *Stephanorhinus jeanvireti*, *Lynx* sp., aff. *Macaca* sp. (SPASSOV, 2000). Taphonomy: Most probably the accumulation of the avian remains is a result of the life activity at a feeding place of large owls (Strigiformes) and carnivore mammals (Carnivora) that shared the cave. Age: The site dates back to the second half of the Middle Ruscinian, MN 15; 3,3-3,1 MA, the Early Pliocene (POPOV & DELCHEV, 1997). The chronostratigraphy follows MEIN (1990). Latterly the age has been determined the second half of MN 15 (SPASSOV, 2000).

Megalo Emvolon locality (Greece). The site is situated 20 km SW of Thessaloniki, Macedonia, N Greece (40:35 N; 22:46 E). It is the best known Ruscinian locality containing fossils of Tertiary vertebrate fauna in Greece. Associated fauna: Reptilia: *Testudo* cf. *graeca*, *Testudo* sp.; Mammalia: *Oryctolagus odessanus*, *Trischizolagus dumitrescuae*, *Trischizolagus* cf. *maritsae*, *Microspalax odessanus*, *Dolichopithecus ruscinensis*, *Nyctereutes tingi*, *Hipparion longipes*, *Parabos macedoniae*, *Koufotragus bailloudi*, *Gazella borbonica* and *Sus minor* (BOEV & KOUFOS, 2000). Taphonomy: The deposits are fluvial and consist mainly of cross-bedded sands, gravel, silts and sand-silts. The character of the sediments indicates a very rapid deposition, while the faunas from the different horizons do not differ (BOEV & KOUFOS, 2000). For this reason all the material is referred to as Megalo Emvolon fauna. Age: The associated megafauna dates the site back to the Early Pliocene (Ruscinian, MN 15 zone) (BOEV & KOUFOS, 2000).

Review of the fossil record of peafowl in Europe

The fossil record of the genus *Pavo* is based on two species - *Pavo bravardi* and *P. aesculapi* (Gaudry, 1862). Adding the new discoveries of Pliocene peafowl in the Balkans, the summary data on the history of these birds will look as follows:

The Bravard's Peafowl is known from seven sites (Fig. 1) in four countries, all in Europe (France, Moldova, Bulgaria and Greece): Serrat-d'en-Vacquer (MN 15), Ardé (MN 16), Saint-Vallier (MN 17), Senèze (MN 17) in France (MOURER-CHAUVIRÉ, 1990, 1993, 1996), Lucheshti (MN 16 /or ?15/) in Moldova (BOCHENSKI & KUROCHKIN, 1987; MLIKOVSKY, 1996b), Muselievo (MN 15) in Bulgaria (BOEV, 1996, 2001) and Megalo Emvolon (MN 15) in Greece (BOEV & KOUFOS, 2000).

The other species, *Pavo aesculapi*, is known from five sites in four countries, all European as well (Greece, Moldova, Ukraine and Hungary): Pikermi (MN 12-13) in Greece (JANOSSY, 1991; MLIKOVSKY, 1996c), Kolkotova Balka (MN 9-10) in Moldova (JANOSSY, 1991; MLIKOVSKY, 1996b), Odessa catacombs (MN 15) (JANOSSY, 1991; MLIKOVSKY, 1996d) and Novoelisavetovka (MN 11) in Ukraine (JANOSSY, 1991; MLIKOVSKY, 1996d) and Polgardi (MN 13) in Hungary (JANOSSY, 1991; MLIKOVSKY, 1996e).

Thus, the fossil record of peafowl in Europe proves their distribution in twelve sites on the continent, three of them on the Balkan Peninsula. Greece is the only country where both Tertiary peafowl were spread, but their occurrence there was not contemporaneous. The Late Miocene record of *P. aesculapi* from Pikermi antedates the new find of *P. bravardi* from Megalo Emvolon by about 3 million years.

It is worth to mention that in SW France (Sansan, MN 6, 15-12 Ma) remains of *Miophasianus altus* have been found (CHENEVAL, 1996). Later this species has been considered to be much more closely related to peafowl (CHENEVAL, 2000). That fact could indicate the much older (MN 6) "European" history of the lineage of the peafowl than what has been considered until now (MN 9).

The habitats of the fossil peafowl

The palaeobotanical analysis of the localities where *P. bravardi* was established shows the presence of some exotic thermophilous floral elements. Their analogues now are spread out of the Western Palearctic - the Caucasus, the Himalayas, Japan, Southeast Asia or Central America (MOURER-CHAUVIRÉ, 1989). At all these sites the remains of deers are numerous. They are considered indicators for woodland habitats with scattered trees. At the new Balkan site of Muselievo an abundance of finds of Cervidae (*Cervus* cf. *pardinensis*, *Procapreolus* sp.) is also well established (SPASSOV, 2000). The Macromammalian fauna indicates presence of forested savanna, light forests to open lands with scattered bush (SPASSOV, 2000). The same habitats are recognized at the other Balkan site, Megalo Emvolon (BOEV & KOUFOS, 2000).

In the Western Europe (France) mixed broad-leafed woods were the preferred habitats of the Bravard's Peafowl and their remains have been



Fig. 1. Geographical distribution of the genus *Pavo* in Europe: *Pavo bravardi* (1-7): 1 - Serrat-d'en-Vacquer; 2 - Ardé; 3 - Saint-Vallier; 4 - Senèze (1-4: France); 5 - Lucheshti (Moldova); 6 - Muselievo (Bulgaria); 7 - Megalo Emvolon (Greece); *Pavo aesculapi* (8-11): 8 - Pikermi (Greece); 9 - Odessa; 10 - Novoelisavetovka (Ukraine); 11 - Kolkotova Balka (Moldova) (Drawing: Vera Hristova)

found in fluviatile, loessic, or lacustrine sites (MOURER-CHAUVIRÉ, 1990). Actually, the two recent species of the Asian peafowl are spread mainly in the open forest with undergrowth along streams, open woodlands, forest-edge and riverine forest, a peculiarity that could explain the occurrence of the *Pavo* remains in the European localities.

Disappearance of peafowl from Europe

The Bravard's Peafowl roamed South-European forests, both in the West and the East of the continent. This species must have appeared there not later than the Late Miocene - Early Pliocene. Possibly, *P. aesculapi* was of a more eastern distribution, where it had spread much earlier than *P. bravardi*. It is considered that the European peafowl disappeared soon after the first cold phases of the Pretegelen (Pretiglian) (MOURER-CHAUVIRÉ, 1990), i. e. over

1 million years ago, together with the disappearance of the whole "tropical" complex.

Muselievo and Megalo Emvolon are the 6th and the 7th site of *Pavo bravardi* up to now. These sites mark its distribution on the Balkans, both in the extreme North of the Peninsula and in its southern regions. Together with the third site of Pikermi, providing finds of *Pavo aesculapi*, they proved the Late Miocene - Early Pliocene distribution of peafowl in the South-east corner of the continent. Being on the cross-road of the terrestrial zoogeographical influences, the Balkans were one of the European territories where the last heat-loving elements disappeared. The Bravard's Peafowl survived in the western parts of the continent (S France) much longer, i.e. by the very end of the Tertiary (the Late Pliocene - Early Pleistocene border) in MN 18.

Summarizing the data available so far, it is clear that the stratigraphic range of *Pavo bravardi* is MN 15-17 (Early to Late Pliocene). *P. aesculapi* was in existence between MN 9 and MN 15 (Late Miocene to Early Pliocene). *Pavo aesculapi* was spread in Eastern and Central Europe, while *P. bravardi* roamed the whole Southern Europe, both Western and Eastern Europe. In Western Europe the latter survived up to the very end of the Pliocene (MOURER-CHAUVIRÉ, 1996). It is likely that in SE Europe this peafowl had survived in the relatively warmer habitats until more recent time, i.e. by the beginning of the Pleistocene.

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Фосилната летопис и изчезването на пауните (*Pavo Linnaeus*) на Балканския полуостров и в Европа (Aves: Phasianidae)

Златозар БОЕВ

(Резюме)

Фосилната летопис на пауните в Европа е твърде оскъдна. Обсъждат се откритите напоследък костни находки от находища от ранния плиоцен (MN 15 с възраст ок. 3,3 - 3,1 млн. г.) в Северна България и Северна Гърция. В тези страни доскоро фосилни пауни не бяха известни. Находките са отнесени към бравардовия паун (*Pavo bravardi*) - най-еграта горска птица в Европа през целия терциер. Те допълват историята на пауните на Балканите - югоизточните предели на разпространението им в Европа.

От направения преглед на находките от известните досега находища на рода *Pavo* в Европа личи, че въпреки по-голямата географска близост на Балканите до съвременния ареал на рода, на Балканския полуостров пауните са изчезнали преди последните пауни в Западна Европа. Единствено от Гърция са известни останки от двата фосилни терциерни вида - ескулаповия паун (*Pavo aesculapi*) и *P. bravardi*.

Стратиграфското разпространение на *Pavo bravardi* е MN 15-17 (ранен - среден плиоцен). Ескулаповият паун е съществувал през MN 9-15 (късен миоцен - ранен плиоцен) и е бил разпространен в Източна и Средна Европа. *P. bravardi* обитавал южните предели на целия континент - както Западна, така и Източна Европа. Разкритата съпътстваща бозайна фауна в находищата на Балканите е сходна с тази от находищата в Западна Европа (Франция). Пауните, както и повечето от останалите представители на топлолюбивата "тропична" фауна, просъществували на Балканите поне до края на ранния плиоцен, а вероятно и до началото на плейстоцена.